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New Harrow Division Plans, Inside Front Cover—Practical Application to Job Analysis, Page 2—St. Louis Chapter Plans Fall Conference, Page 9—Health in Industry, Page 13

August
1939

Non-Ferrous Division Plans For Future



DURING the past year, an attempt has been made to restate and bring into greater prominence, a simple form of regulations under which the Non-Ferrous Division would operate. The main object was the bringing into all committee activities a regular influx of new blood in order that every member of the Division might feel that he had the opportunity of taking a greater part in its work.

Through the valued assistance of the Divisional Activities Correlation Committee, backed by the approval of the Board of Directors, this matter has been consummated.

The establishing of a Non-Ferrous Division dinner as part of the A.F.A. convention will, it is believed, further help to make each member of the Division more conscious of the fact that he is a unit in a live organization to which he owes a duty and from which he has a right to expect recognition.

One of the best methods for a young man to draw favorable attention to himself is by the writing of a paper on whatever subject he considers himself best acquainted. Voluntary offers to write such papers will always be welcomed by our Program and Papers Committee.

The whole thought is that each member of the Non-Ferrous Division should take a keener interest in its development.

Let us all, as a matter of self-interest, as well as "pro bono publico," make a resolution to offer our services in whatever capacity we think they may be of use to the Division.

A stylized, cursive handwritten signature of Harold T. Roast.

HAROLD T. ROAST,
Chairman, Non-Ferrous Division

Mr. Roast, chairman of the Non-Ferrous Division of A.F.A., is vice president in charge of technical operation, Canadian Bronze Co., Ltd., Montreal, and its subsidiaries; owner, Roast laboratories, Montreal; consulting metallurgist, chemist and sessional lecturer, McGill University, department of metallurgy.

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American Foundryman



CONTENTS

August, 1939

Volume I

Number 14

	Page
Non-Ferrous Division Plans for Future, by <i>Harold J. Roast</i>	Inside Front Cover
Practical Approach to Job Analysis, by <i>G. J. Stegemerten</i>	2
A.F.A. to Hold Casting Session at Machine Tool Congress	7
Chapter Activities	8
International Foundry Congress	10
New Chapter Chairmen	11
Non-Ferrous Division Appoints Nominating Committee	12
British Trade Journal Reviews A.F.A. Book on Alloy Cast Iron	12
"Health in Industry," by <i>Paul A. Brehm</i>	13
Abstracts	16

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Practical Approach to Job Analysis

By G. J. Stegemerten, East Pittsburgh, Pa.



This paper was presented before the Time Study and Job Analysis Session of the Annual Convention, Cincinnati, Ohio. The author, Mr. Stegemerten, is superintendent, Time Study and Methods Dept., Westinghouse Electric and Manufacturing Company. In this paper the author emphasizes that job analysis is fast becoming one of management's most important tools. He believes, however, that many individuals often approach this subject with a wrong viewpoint. He points out the importance of a systematic and intelligent approach to job analysis and shows that when so conducted, job analysis leads to improvements of many kinds.

THE factors which surround even the simplest industrial operation are many and varied, and comparatively small progress towards improvement will be made if any job is studied as a whole. Therefore, the first step in the study of any job is to resolve it into its component parts or elements. Each part or element may then be considered separately, and the job thus becomes a series of fairly simple problems. The breaking of the job down into its parts is called analysis.

During primary analysis, the job is broken down into such general factors as material, inspection requirement, and working conditions. Each one of these factors is then examined minutely and critically in order to seek to discover possibilities for improvement. This kind of analytical work is commonly understood to be covered by the term "job analysis." A job analysis may be undertaken by anyone who understands the principles of this technique, and, when systematically conducted, usually leads to improvements of various sorts.

Factors in Approach

It should be borne in mind that, although the first step of methods study consists of job analysis, analytical work does not cease then, but continues in more or less detail throughout the entire study. During secondary analysis or motion study, for example, attention is focused on a single element of the primary breakdown, namely, the method. The method is resolved into terms of basic divisions of accomplishment or basic operations, a process which is a highly refined type of analysis. Even during stop watch time study, analysis con-

tinues, although it is not as detailed as the preceding kinds.

In order to conduct analysis work successfully, a peculiar mental attitude must be developed. When one is in any way familiar with a subject, there is a natural tendency to take pride in this familiarity and to feel that it is something which is attained and which need not be considered further. This attitude, commendable as it may be as a means of securing peace of mind in every day affairs, is fatal to searching analysis. If it is felt that everything is known about a certain point and that it need not be considered further, then no improvement can possibly be made. In order to improve anything it must be approached with the idea that it can be improved. Otherwise failure is certain to result.

If a job has previously been carefully studied, the best method may conceivably have been devised and no further improvement may be possible. Experience has shown, however, that there are few established methods which cannot be improved if sufficient thought is given.

An Example

In this connection, the history of a certain bench operation furnishes an excellent and by no means uncommon illustration of this point. The job originally was done on day work, and past production records showed that the time taken per part was 0.0140 hr. or slightly less than 1 min. The job was time studied and put on an incentive basis with an allowance of 0.0082 hr. The operator worked with a good effort, and made a fair bonus, and the feeling existed for some time that the proper method was being followed.

After the job had been set up for about six months, however,

a suggestion for improvement was advanced. The suggestion was not based upon systematic analysis but was rather the result of inspiration. The suggestion was put into effect and, when the job was restudied, an allowance of 0.0062 hr. was set. This best method lasted for six months more when another suggestion, also of the inspirational type, was advanced. It was adopted and a new time value of 0.0044 hr. was established.

The job was rather prominent, and the changes attracted considerable attention. The thought was advanced that if improvement was possible in the past, it might be possible in the future, and hence the job was selected for detailed motion study. The operation was carefully analyzed by a trained methods engineer, with the result that a completely new method was devised which followed the principles of correct motion practices. When the new method was time studied, an allowance of 0.0013 hr. was set.

The operation was thus improved to an extent where the time required was only approximately 1/11 of that taken at first on the old day work basis or 1/6 of that taken when the original method was followed under incentive conditions. An improvement of such great magnitude justifies the statement that the latest method is a very good method, but, in view of the past history of the job, it would be unwise to say that the best method has been attained.

What Is the Best Method?

As the result of many similar experiences, methods engineers are reluctant to speak without qualifying clauses about the best method. It is safer to speak of "the best method yet devised," implying recognition of the fact that further improvement may be possible even if from an

AMERICAN FOUNDRYMAN

economic standpoint it may not be practical at the time to seek it. Carrying this thought to a logical conclusion, the best method of doing an operation from a labor economy standpoint is reached only when the labor required has been reduced to zero. Until this point has been reached, further improvement is always possible.

This principle furnishes a foundation for the approach to job analysis. If it is clearly recognized, it insures an open mind. Such mental obstacles as "it

in originating suggestions himself if he wishes to get results.

Other things being equal, the greatest amount of originality, or what passes for originality in a world where it is often said that there is nothing new, is evinced by those who have an inquiring turn of mind. The man who constantly asks questions and takes nothing for granted is often a disturbance to the contentment of those who are willing to accept things as they are, but he is the one who originates

he studies, insofar, at least, as he has time. He even asks questions when the answers appear obvious, if he thinks he can bring out something by so doing.

Some Pertinent Questions

The questions asked take the general form of what? why? how? who? where? and when? What is the operation? Why is it performed? How is it done? Who does it? Where is it done? When is it done in relation to other operations? Those questions in one form or another should be asked about every factor connected with the job being analyzed. Typical questions which arise during the study of industrial operations are as follows:

If more than one operator is working on the same job, are they all using the same method? If not, why not? Is the operator comfortable? Sitting down as much as possible? Does the stool or chair being used have a comfortable back and a wide enough seat? Is the lighting good? Is the temperature of the work station right? Are there drafts? Are there arm rests for the operator? If the operation can be done either seated or standing, is the height of the chair such that the elbows of the operator are the same distance from the floor in either case?

Can a fixture be used? Are the position and height of the fixture correct? Is the fixture the best available? Is the fixture designed in accordance with the principles of motion economy? Would a fixture holding more than one piece be better than one holding a single piece? Can the same fixture be used for more than one operation? Can a clamp, a vise, or a fixture be substituted for the human hand for holding? Are semi-automatic tools such as ratchet or power-driven wrenches or screw drivers applicable?

Is the operator using both hands all of the time? If so, are the operations symmetrical? Do the hands move simultaneously in opposite directions? Can two pieces be handled at one time to better advantage than one? Can a foot device be arranged so that an operation now performed by hand can be done by foot?

Are raw materials properly placed? Are there racks for pans

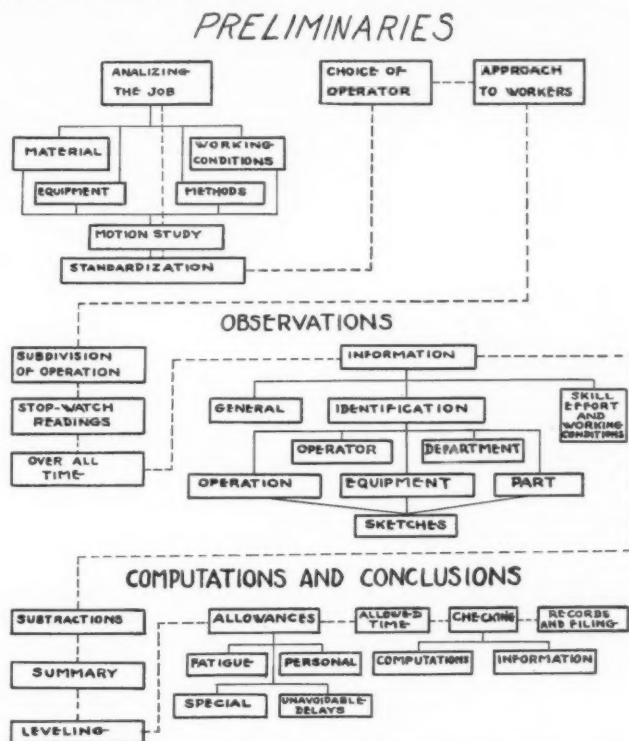


Fig. 1 Graphic Analysis of Motion and Time Study Procedure.

won't work," "it can't be done," and "it was tried before and didn't work" are cleared away at the outset. Lack of success in improving any job is not interpreted to mean that the job cannot be improved but rather that no way of improving it has yet been discovered. There is a vast difference in the two interpretations. The first induces contentment with things as they are and leads to stagnation; the second inspires further attacks from different angles and leads to progress.

The Questioning Attitude

An open mind paves the way for successful analytical work, but it is not sufficient in itself. One can be open minded in the passive sense of being receptive to suggestions, but this will not lead to accomplishment. The analyst must take the initiative

new things. Improvements came first from examining what is with an open mind and then inquiring into what might be.

The analyst realizes this and conscientiously strives to develop what is called the "questioning attitude." He takes nothing for granted during his studies but questions everything. He attempts to determine the answers on the basis of facts, and guards against the influence of emotions, likes and dislikes, or preconceived prejudices.

The successful analyst has few deep-seated convictions. He accepts little or nothing as being right because it exists. Instead he asks questions and gathers answers which he evaluates in the light of his knowledge and experience. He questions methods, tools, and layouts. He investigates all phases of every job

of material and containers for smaller parts? Can the parts be secured without searching and selecting? Are the most frequently used parts placed in the most convenient location? Are the handling methods and equipment satisfactory? Would a roller or a belt conveyor facilitate handling? Can the parts be placed aside by means of a chute?

Is the design of the apparatus the best from the viewpoint of manufacturing economy? Can the design be changed to facilitate machining or assembly without affecting the quality of the apparatus? Are tools designed so as to insure minimum manipulation time? Can eccentric clamps or ejectors be used?

Is the job on the proper machine? Are the correct feeds and speeds being used? Are the

cause he accepts things as they are instead of questioning them.

Job Analysis Need Not Be Confined To Methods Engineers

Although the questioning attitude is developed by the methods engineer as an aid to thorough analysis, it need not be and should not be his sole property. The other shop supervisors will find it equally useful for attacking their particular problems and finding solutions for them. If they focus it on operating methods, they will be able to make many improvements in the course of their daily work. Thus methods improvement work will progress more rapidly than it would if it were left entirely to the methods engineer.

For the Smaller Plant

Many smaller plants for one reason or another do not undertake formal methods work, and

to question the tools, set-up, and method used on a certain job before the purpose of the operation was considered. Better tools might be devised and the method might be changed, but if it were later found upon examination of the purpose of the operation that it need not be done at all, the time and money spent on tool and methods changes would be wasted.

Making Suggestions for Improvement

When a job is examined in all its details with an open mind and when all factors which are related to it are questioned, possibilities for improvement are almost certain to be uncovered if the job has not been studied in this way before. The action which is taken upon the possibilities will depend upon the position of the one who uncovers them. If he has the authority to take action and spend money, he will undoubtedly go ahead and make the improvements without further ado. If, however, as is more often the case, he does not have the authority, he must present his ideas in the form of suggestions to the one who does.

There are certain pitfalls to be avoided in making suggestions. In the first place, the true worth of each suggestion should be carefully evaluated before it is offered. If one establishes a reputation for offering only suggestions of real merit, he will find it easier to secure an attentive hearing than if he is continually advancing suggestions which have to be examined to separate the good from the impractical.

The quickest way to prove the merit of any suggestion is to make or obtain estimates of the cost of adopting it and the total yearly saving it may be expected to effect. These two figures will show just how much must be spent and how long it will be before the expenditure will be returned. If a suggestion costs \$10.00 to adopt and will save \$1.00 per year, it is not worth presenting unless there are unusual circumstances. If on the other hand an expenditure of \$10.00 will bring about a yearly saving of \$100.00, the suggestion is worthy of careful consideration.

When the suggestor has convinced himself of the value of his idea, he should present it to the one who is in a position to

AMERICAN FOUNDRYMAN



Fig. 2 Job Analysis Operator Observing Machine Job.

specified tolerances correct for the use to which the part is to be put? Is the material the most economical for the job? Can the operator run more than one machine or perform some other operation while the machine is making a cut? Would a bench of special design be better than a standard bench? Is the work area properly laid out?

This list of questions could be extended almost indefinitely, but enough have been given to illustrate the sort of questions that should be asked during a methods study. The importance of asking such questions is paramount. The chief difference between a successful analyst and one who seldom accomplishes much is that the former has developed the questioning attitude to a high degree. The latter may be capable of making the same improvements as the former, but they do not occur to him be-

they employ no one in the capacity of methods engineer. In such cases, it will be particularly desirable for all members of the supervisory force to develop the questioning attitude. It is extremely easy to view things without seeing them when they are supposedly familiar. Those most familiar with the work are the least likely to see opportunities for improvement unless they consciously try to remain as aware of their surroundings as they would be were they new to the plant. In small plants, the supervisory group does not change often, and hence the cultivation of the questioning attitude is almost essential to progress.

Questions should not be asked haphazardly, although this would be better than asking no questions at all. Rather it is better to proceed systematically, questioning points in the order in which they should be acted upon. It would be unwise, for example,

adopt it. Here again the estimates of expenditure and return will prove valuable. The statement that much time will be saved or even that a saving of 0.0050 hr. per piece can be made is not likely to mean as much to a manager or superintendent as a saving of a certain number of dollars per year. The manager is usually a busy man, and he will appreciate a complete presentation which includes cost and savings totals. If these are not

pies the mind when it should be engaged in originating new suggestions and often causes dissatisfaction and reduces efficiency.

The rejection of an idea does not mean that it possesses no merit. It merely indicates that the benefits it offered did not appear to the one who makes the decision to be sufficiently important to warrant expending the effort necessary to get them. The decision is made in the light of such factors as present trends,

nental Roll and Steel Foundry Company, East Chicago, Ind.

Chairman Robson: This is the annual session of the Time Study and Job Analysis Section of the Association. Most of us, when we think about motion study or time study consider it only in connection with small, light operations. Our speaker I believe will give us a different viewpoint. I take great pleasure in introducing Mr. Stegemerten, Supervisor of Time Study and Methods Department, Westinghouse Electric and Manufacturing Company.

Mr. Stegemerten abstracted his paper and showed several moving picture films.

Member: What is the basis on which the foundry operator is paid for the work performed?

Mr. Stegemerten: He receives a time allowance expressed in decimal hours for each piece made. The total time allowed for his production over a given period is determined by multiplying the number of pieces produced by the allowances for each piece. The money earned for this period is arrived at by multiplying the total allowed hours made by the operator's hourly rate. For example, if each piece time allowance is 0.02 hours and the operator produced 300 pieces in a 40 hour work week he will have made 60 hours in the 40 hours worked. If the hourly rate of this operator is \$0.60 his earnings for this weeks production would be $60 \times \$0.60$ of \$36.00. We do not pay for the performance on a job for a day, all of the time made during a pay period is accumulated and this accumulation is multiplied by the hourly rate, to arrive at the earnings for the period.

The operator knows how much time he gets for each job and he knows what his rate is. It is just a matter of multiplying that time by the rate and that is his piecework if he wants to consider it in terms of money.

Member: Do you pay for the mold that is put on the floor or do you pay for the good castings after they are inspected?

Mr. Stegemerten: Principally for good castings, there are exceptions. If there are some rejections that are not at all due to the operator, he will be paid for them. The same policy exists throughout our company. Generally speaking, we pay only for work which passes inspection. The supervisory force and the inspection department decide. If

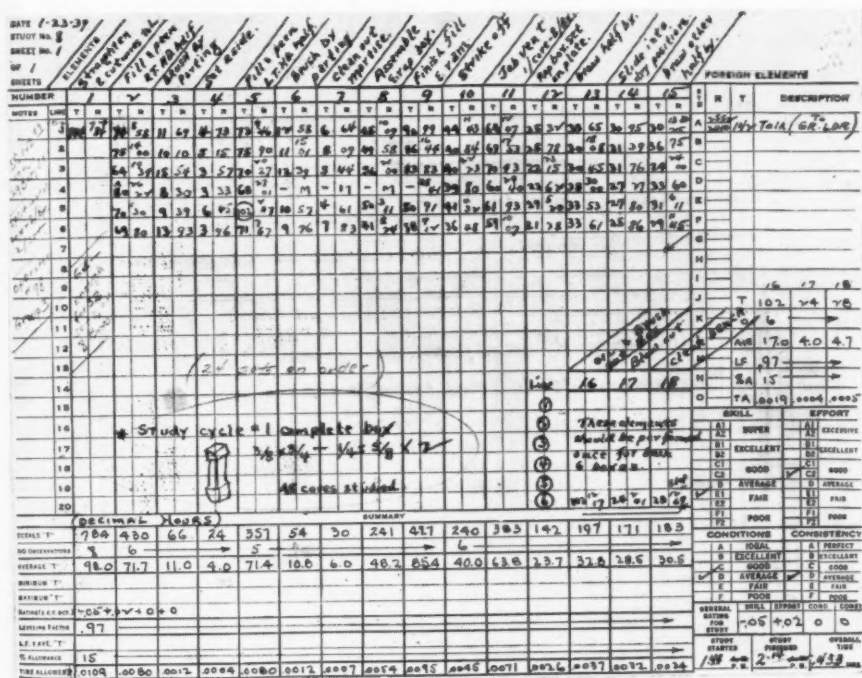


Fig. 3 Front of Typical Observation Sheet—Study of a Core Making Job.

furnished, he will have to request them anyway, and this will only postpone final action.

Occasionally, ideas occur which appear to possess advantages to the originator other than those which can be measured in dollars and cents. In presenting suggestions of this nature, advantages and disadvantages should be presented in tabulated form, so that a decision can be quickly made.

Ideas of this kind are more subject to rejection than those which show definite money saving. Perhaps the advantages to be gained are so largely theoretical that a busy man is not able to visualize them, or perhaps the cost of making the change seems to outweigh the intangible benefits which are expected. If a suggestion of this type is rejected after proper presentation, the suggestor should drop it and cease to worry about it. Fretting about unadopted ideas occu-

the future business outlook, and the amount of money available for making improvements. In six months or a year, the situation may have changed and the idea may be welcomed and adopted upon representation. If the idea is presented the second time by another individual, the one who first presented it has a natural tendency to feel discouraged. He must ward off this feeling by recognizing that conditions change and that fresh angles of presentation often lead to the adoption of old ideas. The best antidote against discouragement is to go out and uncover another idea. Solving problems and originating suggestions bring satisfaction to the type of men who are in supervisory positions and they will help to make the daily job more interesting.

Discussion

Presiding: H. C. Robson, Conti-

there is a doubt regarding responsibility, the operator is given the benefit of the doubt.

Member: What is the procedure in eliminating some of these moves that were made and probably considered necessary at the time of the first of your studies? In one of the films shown I noticed that venting was being done and in the subsequent operation, when it was speeded up, the venting was entirely eliminated. Is there some compensation paid for that?

Mr. Stegemerten: That was entirely a contribution of that particular operator. In the other foundries where venting was done on similar work it was considered as being necessary. In taking these pictures we started out with the idea of comparing the methods used in our different foundries to determine any advantages that one method might have over another. We considered that it would be much cheaper and easier to get these pictures of the different methods used in the different foundries and then bring them all together, which was, in effect, bringing all of the foundries to one place rather than to take all of the men from the various foundries around to these different foundries. It proved to be very successful in demonstrating that there were certain things being done in certain places that were not necessary.

Member: How do you compensate the operator when there is lost time which isn't his responsibility, such as lost time due to a breakdown of a machine?

Mr. Stegemerten: He is paid day work on the foreman's expense account for such lost time, if it is not his responsibility. Time lost that is the company's responsibility is paid for and charged to an expense account which is provided for this purpose.

Member: What reaction did you have from your men in some of these other plants when you showed them this last picture?

Mr. Stegemerten: I think you probably know that as well as I do. At first it was not favorable and some said, "Surely you don't expect a man to work like that?" And, as I said before, we don't. This man benefits by his effort. If he chooses to work that way, he gets the benefit in extra compensation. He makes much more time than it is expected that an operator will make. We wouldn't set a time allowance based on his performance for him or any other operator.

It helped to show this picture to our men. The questionable things

which the other men were doing, as shown by this picture, we eliminated, which shortened the time to do the work.

Member: Do you expect the other men to use the new method and meet the new standard time?

Mr. Stegemerten: Yes.

Member: Making allowances for various standard motions, how do you determine the standard effort that you expect of the operator?

Mr. Stegemerten: We have and know the time it takes with normal effort to make standard motions.

Member: Do you have an average man, who is timed on all these various jobs, that you set your rates by?

Mr. Stegemerten: We don't think in terms of an average man because

ments timed or do you make individual studies?

Mr. Stegemerten: At our plant at East Pittsburgh, which is the main plant of the Westinghouse Company, we employ normally about 12,000 hourly paid operators. We have a time study and methods force of about 100 men and we establish an average of 100,000 new operation allowances each month. It can be seen, therefore, that it would be quite a task to time study that many operations. Instead, we study a class of work and compile formulas or standard data. Standard data will consist of all of the elements that might be employed in any class of work, with corresponding time allowances. Then, whatever the operation is, if it is a drill press operation,

STUDY NO. 1 DATE 1-23-39. (SAMPLE STUDY)

CONJ. 29 047 41

DEPARTMENT Make Core Mould DIE

OPERATOR NAME Bill S. No. 98 PATTERN SC142 INS. SPEC. L. SPEC.

EQUIPMENT BENCH COREMAKING- (associated hand tools) MATERIAL ALUMINUM

NO.	ELEMENTS	SMALL TOOL, MIN. FEED SPEED, 100% OF CUT	ALLOWANCE PER CENT	TOTAL TIME ALLOWED
1	Straighten and cut wire to length.	.010	5%	
2	Fill and press right hand half.	.012		
3	Brush box (left) parting.	.012		
4	Set aside.	.004		
5	Fill and press left hand half.	.012		
6	Brush box (right) parting.	.012		
7	Clean out machine.	.007		
8	Assemble and rap box.	.004		
9	Finish fill and ram.	.005		
10	Strike off.	.005		
11	Tap vent.	.001		
12	Rap box and set off on plate.	.006		
13	Draw one half of box.	.007		
14	Slide to drying position.	.002		
15	Draw other half of box.	.004		
16	Oil and brush out box.	.004		
17	Blow out box.	.004		
18	Clean off bench.	.005		
TIME ALLOWED, SET UP, 0.73		MACHINE, 0.189		PER BOX TOTAL, 0.726
REMARKS:		Total per set = $0.726 \times \frac{1}{2} = 0.1815$		
		Slider & misc. allowance = $4\frac{1}{2}\% = 0.0076$		
		Set up established by Formula Lw10(11) = 0.189		

For handle, dry and finish, see 5th 1-23-39.

Fig. 4 Back of Observation Sheet of Fig. 3 Showing Elements of Core Job With Time Allowances Set.

usually one gets into difficulties by doing so. We rather speak of an average performance.

Member: Do you have data as to how much time it takes to handle your flask, set your pattern in, and all such operations from which you can build up your standard time?

Mr. Stegemerten: Yes. The handling of a flask, like the handling of any other part or any other operation, involves certain motions, and we know the time for those motions. We secured these data by extensive time study on a number of different men?

Member: Just what procedure do you use in establishing time on a new job? Do you have your ele-

the time study man will apply his drill press formula. He will take the drawing of the part which will specify whether there has been a fixture made for it, he will examine the fixture and then write out a list of the elements in the same terms and the same divisions that he has previously compiled his formula or standard data and then apply the standard times for these standard elements. In this way he arrives at a time for the operation. The time to calculate the average operation from formulas is not over two minutes, varying, of course, from a quarter of a minute to an hour, the larger operations of course requiring the greater time. Examples of the larger operations are building a core in a large piece of power apparatus, the

machining of a large casting, the winding of a large turbo, etc. Some of these operations take days to perform and there are a large number of elements involved.

Member: Assume you have a certain time set on a job, say on a squeezer machine, and the molder is drawing down a certain bonus and he finds out that by eliminating certain operations, such as venting, he can save a few seconds on a mold, and maybe by eliminating some other operation he can save a few more seconds, and gradually he has built up a bonus there that is probably 200 per cent, we will say, of what he used to make. Then some of the other squeezer men find out that this other fellow has eliminated a lot of operations and they, in turn, do the same thing. In other words, your whole production over your whole plant or over all these squeezers has stepped up considerably. Then in a short while competition comes in and you find you are paying quite a bit for this particular job and, while your men really have helped you to step up production, at the same time you can't afford to pay the prices you are paying. How do you take care of such a situation?

Mr. Stegemerten: It is our policy not to reduce time values once established unless based on a change of method or design originated by the company, but, to avoid the condition which you speak of becoming too burdensome, we have a very liberal suggestion system, and we encourage our operators to turn in suggestions on improvements and we will pay them as much as 10 per cent of the savings for a year's activity. Of course, our policy does not include, necessarily, a guarantee of new jobs. We reserve the right to set new jobs more in line with the possibilities that have been demonstrated.

Member: Have you adopted any minimum standard of number of parts to be made which you consider justifies time study or job analysis?

Mr. Stegemerten: No, we haven't. We will set a time value on one piece but we make our allowances for set-up, and each piece time, so that every job that comes through, regardless of the quantity on order, has a time allowance. In this way we get around what you probably have in mind, that if we have a one-minute operation on a quantity of one or two pieces the operator could not get ready, get his drawing, read the drawing, get his tools and set up to do the job in anywhere near the time. Therefore, we allow him the time that it takes to make the set-up

and then a time for each piece after the set-up is made.

Member: Do you have any provisions for group set-ups? That is, for such operations as shaking out where individual times can't be set to advantage, as where there are groups working together to turn out certain work?

Mr. Stegemerten: Yes, we are very favorable to groups at Westinghouse and about 80 to 90 per cent of all of our productive work which is done on incentive is done on a group basis. However, if we get our groups too large, we feel that it will destroy individual initiative. We have established a maximum of 15 people in a group unless it receives special approval by our Occupation and Rates Committee, which committee investigates the conditions to determine whether there can be a logical segregation into smaller groups.

There are cases where there is no logical segregation, and it is difficult to credit a certain portion of the output to a number of men and another portion to some other number. In those cases, we do not allow groups to exceed 15 in number. We have 800 groups in Westinghouse at East Pittsburgh and I don't think that there are over 40 of those that will exceed 15 in number, and 50 per cent of the 800 are less than 15 in number.

We recognize that there must be an opportunity for cooperative team work in order for group operation to be successful. If you make your groups too large, so that the individuals who are sharing their efforts and output are not very familiar with one another and don't have an opportunity to cooperate and assist one another, you will bring in this destruction of individual initiative which you probably have in mind.

In that connection, I might mention that about four years ago a certain large company made an extensive survey of the application of groups in industry. They included in that survey all the prominent industrial concerns in the country and they rated our procedure as being the most common sense application of groups that they had run into. They found one company that had whole departments comprising as many as 250 people in one group. A department occupying a large aisle, 1200 feet long, would comprise a group. New operators would be placed down at one end of the aisle and they wouldn't know the operators that they were pooling their earnings with at the other end. They were not having success with the group system

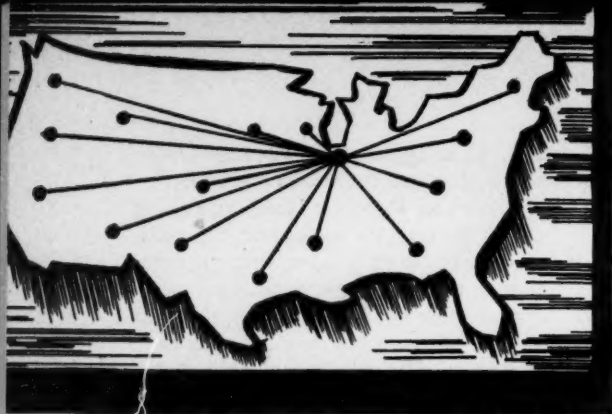
and I understand that they have since changed to smaller groups.

Chairman Robson: Relative to the group bonus, we have just recently installed a sand slinger and we have been doing experimenting with groups. We started out with a group of 12, 11 molders and one slinger operator. We finally got that down to four men and the slinger operator and still are getting the same production. So I agree with Mr. Stegemerten that the lower you keep your group in size, the better off you are.

Castings at the Machine Tool Show

OCTOBER 4 to 13 a Machine Tool Show will be staged in Cleveland under the auspices of the National Machine Tool Builders' Association. Realizing that the occasion offers unusual opportunities for presenting the utility of cast metal products, the American Foundrymen's Association with the cooperation of trade organizations representing the Gray Iron, Steel, Malleable and Non-Ferrous casting divisions are planning an Exhibit on behalf of the Foundry Industry. A wall space having a frontage of 82 feet has been reserved for this purpose and Committees of each group are actively at work completing plans for an outstanding Exhibit of cast metal products.

One session of the Machine Tool Congress is being sponsored by A.F.A. for the presentation of papers on castings uses. This session is under the direction of an A.F.A. committee with A. C. Denison, Fulton Foundry & Machine Co., as chairman. Serving with Mr. Denison are Ralph West, West Steel Casting Co., and Dr. H. A. Schwartz, National Malleable & Steel Castings Co. This session will feature papers on "Castings as an Engineering Material" and it will be held at the Hotel Hollenden, Monday evening, October 9. The speakers scheduled are Dr. Schwartz, Mr. Denison and James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind. The Northeastern Ohio Chapter is cooperating in this session by scheduling it as one of their regular monthly meetings.



Chapter Activities

Phila. Chapter Holds Plant Visitation

By J. T. Fegley,* Philadelphia, Pa.

A RAINY day did not interfere with the annual outing and plant visitation of the Metropolitan Philadelphia Chapter on June 29. About four hundred foundrymen and friends gathered at the plant of the Pusey and Jones Corp., Wilmington, Del., to witness the launching of the U. S. Government lighthouse tender "Mistletoe" at 11 a. m. The launching went off in grand style and the group then proceeded to the ballroom of the Grande Hotel where a buffet luncheon with plenty of liquid refreshments was served.

After the luncheon those interested in malleable iron were entertained by the Eastern Malleable Iron Company where a thirty-five ton heat was run off, which was followed by a visit through their immense plant. Later in the afternoon the group returned to Pusey & Jones Corp., where an inspection of their foundry was made and another pour was witnessed. As usual, during the afternoon some of the men went off to the races where they tried their luck with the "ponies."

At 7 o'clock the group met again at the Grande Hotel for a steak dinner which was delightfully prepared and served. Our local chairman, Harold Henszey, made a few remarks—there were no speeches—principally to introduce the newly elected chairman for the coming year, Wm. C. Hartmann of the Bethlehem Steel Co. Mr. Henszey thanked the group for the support given him and took occasion to compliment the committee headed by

Jack Robb for the splendid turnout and efficient manner in which all details of the visitation were planned.

In addition to Bill Hartmann as chairman, the election of the following was announced: *Vice chairman*, R. J. Keeley, Ajax Metal Co.; *secretary-treasurer*, W. B. Coleman, W. B. Coleman

Co.; *directors*, R. H. Reitingier, U. S. Pipe & Foundry Co., and M. R. Taggart, Taggart & Co.

After dinner the group was entertained with a wonderful floor show and as the committee had assembled a lot of prizes, it was a happy and contented crowd that finally wended its way homeward after the lucky numbers were drawn to take up on the morrow all the trials and tribulations of the foundry business.

Southern California Holds Annual Meeting

By M. S. Robb,* Los Angeles, Calif.

THE final meeting of the 1938-39 year of the Southern California Chapter was held June 22 at the Clark Hotel, Los Angeles. With chapter chairman J. G. Coffman presiding, the members were first entertained by a musical program provided by the entertainment committee, while a movie film, "From Mine to Consumer," was shown through the courtesy of the Anaconda Copper Co. and the American Brass Co. B. G. Emmett, Los Angeles Steel Casting Company, a chapter delegate to the A.F.A. Convention at Cincinnati, gave a brief review of some of the high points of the convention. The technical part of the meeting was a very interesting talk by G. W. Effinger, Snyder Foundry Supply Co., who discussed "Mechanical Cupola Charging." The talk was illustrated by the use of a model demonstrating unit of a working cupola charging equipment of the Whiting Corporation.

This being the last meeting of the year was also the annual

business meeting with officers and directors being elected. Officers elected were:

Chairman: A. G. Zima, International Nickel Co.

Vice Chairman: Jas. E. Eppley, Kinney Iron Works.

Secretary: W. F. Haggman, Foundry Specialties Co.

Treasurer: Charles R. Gregg, Reliance Regulator Co.

Four directors were elected to serve two years. These were:

R. J. Crichton, American Brake Shoe & Foundry Co.



A. G. Zima
Chairman, Southern California Chapter

AMERICAN FOUNDRYMAN

*North Bros. Mfg. Co. and Chairman, Chapter Publicity Committee.

*Bethlehem Steel Co. and Secretary, Southern California Chapter.

Pasquale Arpea, Axelson Mfg. Co.

J. G. Eberhart, Kay-Brunner Steel Products, Inc.

T. J. McGraw, Jas. E. McGraw & Son.

Retiring chairman Coffman presented an excellent review of the year's activities after which the chapter expressed its appreciation for his excellent management of the chapter for the year.

St. Louis Chapter Plans Third Fall Conference

THAT the chapters are thinking about fall activities is shown by the announcement from the St. Louis Chapter that its Fall Regional Conference will be held as a three-day meeting, October 5, 6 and 7. Headquarters and discussion sessions will be at the Jefferson Hotel, St. Louis. The previous Fall conferences of the chapter were held at Rolla, Mo., in cooperation with the Missouri School of Mines & Metallurgy. The move to St. Louis has been made to increase attendance on the part of shopmen. Louis J. Desparois, Pickands Mather & Co., St. Louis, is chairman of the conference committee.

For the first day, Thursday, October 5, extensive plans for plant visitation are being developed with this first day being climaxed by a get-together smoker. The tentative schedule for the Conference sessions is given below.

Tentative Schedule

St. Louis Fall Conference October 5 to 7

Thursday, October 5

Registration, Jefferson Hotel.

Plant Visitation.

Evening—Smoker.

Friday, October 6

Morning—General Session—*Design as Related to Casting Problems.*

Chairman, L. N. Shannon, Vice President and Works Manager, Stockham Pipe Fittings Co., Birmingham.

Speakers: Steel Castings—A. H. Moorehead, Locomotive Finished Materials Co., Atchison, Kansas.

Gray Iron—E. B. Carpenter, American Car & Foundry Co., St. Louis.

Non-Ferrous—To Be Assigned.

Noon—Luncheon.

Address of Welcome: L. E. Everett, Chapter Chairman and Foundry Superintendent, Key Co., St. Louis.

Address: T. Dysart, President, St. Louis Chamber of Commerce.

Afternoon—

1:30-3:00—*Sand Control Session.*

Chairman: T. C. Hamlin, U.

S. Radiator Co., Edwardsville, Ill.

Speakers: H. W. Dietert, Harry W. Dietert Co., Detroit.

N. J. Dunbeck, Eastern Clay Products Co., Eifort, Ohio.

3:15-5:00—Steel Casting—*Gating and Feeding.*

Chairman: H. M. Rishel, American Steel Foundries, Granite City, Ill.

Speaker: A. Johnson, Oklahoma Casting Co., Tulsa, Okla.

3:15-5:00—Gray Iron—*Gating and Riserling.*

Chairman: C. B. Shanley, Semi-Steel Casting Co., St. Louis.

Speaker: Representative of Caterpillar Tractor Co., Peoria, Ill.

7:00—Conference Dinner.

Chairman: L. E. Everett, Chapter chairman.

Address: Karl Landgrebe, Tennessee Coal Iron & Railroad Co., Birmingham, Ala.

Saturday, October 7

Morning

9:00-12:00—Round Table Discussions.



L. E. Everett

Chairman, St. Louis Chapter
To Preside at Fall Conference

Session A—Gray Iron.

Chairman: Carl Morken, Carondelet Foundry Co., St. Louis.

Subject: "Melting Practice." Discussion Leader: G. P. Phillips, International Harvester Co., Chicago.

Subject: "Core Making." Discussion Leader: L. P. Robinson, Werner G. Smith Co., Cleveland, O.

Session B—Steel.

Chairman: F. X. Hahn, Scullin Steel Co., St. Louis.

Subject: "Application of Internal and External Chills." Discussion Leader: W. F. McKee, Key Co., East St. Louis, Ill.

Subject: "Core and Mold Washes." Discussion Leader: P. J. Dapkus, Decatur Milling Co., Decatur, Ill.

Session C—Non-Ferrous.

Chairman: F. O'Hare, Central Brass & Aluminum Co., St. Louis, Mo.

Subject: "Defects in Non-Ferrous Castings." Discussion Leader: Arthur Fritschle, Federated Metals Div., A. S. & R. Co., St. Louis.

10:00—*Special Student Session* (Simultaneous with Round Table Discussions)

Chairman: C. Y. Clayton, Missouri School of Mines and Metallurgy, St. Louis.

Speaker: C. R. Culling, Carondelet Foundry Co., St. Louis.

International Foundry Congress Completes Successful Meeting

WITH an attendance of over 600 from some 20 countries, the Seventh International Foundry Congress was held in London, June 12 to 17. The A.F.A. was officially represented by Past President W. R. Bean, Whiting Corporation, Harvey, Ill., and Dr. H. A. Schwartz, National Malleable & Steel Casting Company, Cleveland, O., and Vincent Delpont, London. Others present from the U.S.A. were George W. Cannon, Campbell, Wyant & Cannon Foundry Company, Muskegon, Mich., and C. R. Austin, Pennsylvania State College, State College, Pa.

France was represented by the largest delegation, 54, which came from outside the British Isles. Other countries represented were Belgium, Poland, Italy, Germany, Norway, Denmark, Holland, Hungary, Sweden, Australia, South Africa, Czechoslovakia, India, Switzerland and Luxemburg.

The Congress was officially

opened at the Dorchester Hotel, June 13. The presiding officer was the retiring president of the I.B.F., J. Hepworth, Bradford Piston Ring Co., Ltd. At this session Dr. Guido Vanzetti of Italy, president of the International Committee of Foundry Technical Associations, spoke, emphasizing the need of foundry research. As mentioned in the July issue of the *American Foundryman*, Dr. Schwartz was presented with the E. J. Fox Gold Medal of the Institute of British Foundrymen in recognition of his work in the malleable cast iron field. J. G. Pierce, director, British Cast Iron Research Association, was presented with the Oliver Stubbs Gold Medal and the Institute's Meritorious Services Medal was awarded to J. E. Cooke, a past president of the Institute. Both Mr. Pierce and Mr. Cooke will be remembered by A.F.A. members for their exchange papers presented before A.F.A. conventions.

W. B. Lake, governing director, Lake & Elliot, Ltd., Baintree, Essex, was elected the president of the I.B.F. for the coming year.

During the Congress, the A.F.A. official exchange paper, prepared by Fred A. Melmoth, Detroit Steel Castings Co., was read. The paper was entitled "The Renaissance of the Steel Casting and the Role of the Metallurgist."

1942 International Congress

Awarded to A.F.A.

Thirteen countries were represented at the meeting during the week of the International Committee on Testing Cast Iron, the AFA representatives being Messrs. Bean, Schwartz and Delpont. During the week, the annual meeting of the International Committee of Foundry Technical Associations, the group which supervises the International Congresses, was held with President Vanzetti as chairman. J. Lobstein, president of the Association Technique de Fonderie de France, was elected president of the International Committee for the coming year and a calendar of future congresses was adopted. The International Congress of 1942 was assigned to the U. S. A. with the congress to be under the direction of the AFA.

Northern California Chapter Plans A. F. A. Day at Exposition

THE Northern California Chapter invites all A.F.A. members who may be in California on September 9 to join with them in "American Foundrymen's Association Day" at the Golden Gate Exposition. Special invitation is being sent to the members of the Southern California Chapter to participate. Out-of-state members who can attend are requested to get in touch with the chapter secretary, Geo. L. Kennard, 304 Rialto Bldg., San Francisco.

AMERICAN FOUNDRYMAN



At Buffalo Chapter Outing—Upper left: Chairmen, present and past, Bill Corbett, Atlas Steel Foundry; Ted Burke, Otis Elevator Co.; Mark Pohlman, Pohlman Foundry Co. Upper right: Art Suckow, Gould Coupler Corp., makes a hit and the score is foundrymen, 4; vendors, 44. Lower: A few of those attending the outing and all having a good time.

(Pictures courtesy Bob Glass, Republic Steel Co. and Chapter Treasurer.)



W. J. MacNeill
Wisconsin



E. F. Hess
Northeastern Ohio



W. J. Corbett
Buffalo



H. H. Judson
Central New York

New Chapter Chairmen

Northeastern Ohio Holds Outing

By Pat Dwyer,* Cleveland, Ohio

ANNUAL summer outing of the Northeastern Ohio Chapter was held on June 24 at the Lake Forest Country club, Hudson, Ohio. More than 200 were present at the evening dinner which climaxed the outing while approximately 130 were entered in the golf tournament. One of the features of the program was the annual 7-inning softball game between the vendors and the foundrymen. Although the foundrymen's team ran up the score in the early stages of the game, the vendors came back strong in the fifth inning, and the game ended with a 7 to 6 score in favor of the foundrymen.

*Engineering Editor, The Foundry.

Bob Kennedy, genial secretary of the A.F.A. acted as umpire, and gave his decisions like a professional. Final feature of the outing was presentation of prizes after the dinner. Carl Larson, Osborn Mfg. Co., received first prize in the golf tournament for a low gross score of 77.

Central New York to Hold First Summer Outing

THE officers of the Central New York Chapter have set August 24 as the date for its first summer outing and picnic. A cordial invitation is being issued to all foundrymen and their friends of the district to participate. The outing chairman is Leo Lonergan, Morris Machine Works, Baldwinsville, N. Y., and those planning to attend are re-

quested to get in touch with him in order that they may receive detailed information as to time and place and events which are being scheduled.

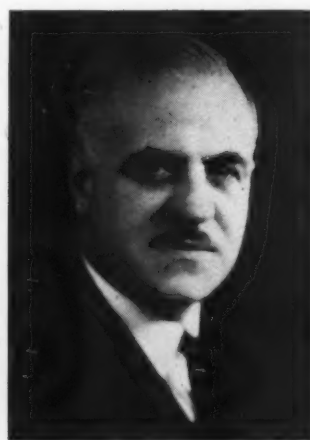
New Chapter Chairman

ON THIS page are shown some of the recently elected Chairmen of chapters to preside during the coming year.

Their company connections are H. H. Judson, Goulds Pumps, Inc., Seneca Falls, N. Y.; W. J. Corbett, Atlas Steel Casting Co., Buffalo, N. Y.; E. F. Hess, Ohio Injector Co., Wadsworth, O.; W. J. MacNeill, Federal Malleable Co., West Allis, Wis.; R. C. Harrell, Stockham Pipe Fittings Co., Birmingham, Ala.; S. D. Russell, Phoenix Iron Works, Oakland, Calif.; C. E. Westover, Burnside Steel Foundry Co., Chicago, Ill.; D. J. Macdonald, Dominion Radiator & Boiler Co., Toronto, Canada.



D. J. Macdonald
Ontario



C. E. Westover
Chicago



S. D. Russell
Northern California



R. C. Harrell
Birmingham

New Chapter Chairmen

Non-Ferrous Division Appoints Nominating Committee

AT the annual business meeting of the Non-Ferrous Division of A.F.A., held at the Cincinnati Convention, Monday, May 15, 1939, Chairman Harold J. Roast, Canadian Bronze Co., Ltd., Montreal, Canada, appointed five members of the nominating committee. It is the duty of this committee to submit for election at the annual business meeting of the division at next year's convention, nominations for a chairman, vice chairman and three members of the advisory committee.

Such elections are held in even numbered years in accordance with Article IV, Section 1 of the new regulations governing the

division, which were also given approval at the meeting. Committee appointments are in accordance with the same article, Section 2, of the regulations.

Members of the nominating committee are as follows:

Sam Tour, Lucius Pitkin, Inc., New York, chairman.

E. G. Jennings, Canadian Bronze Co., Ltd., Montreal, Canada.

J. W. Kelin, Federated Metals Division, American Smelting & Refining Co., St. Louis, Mo.

G. K. Eggleston, Detroit Lubricator Co., Detroit.

M. E. Brooks, Dow Chemical Co., Midland, Mich.

which has been made of alloy cast iron. (5) It indicates a scope which so far as this country is concerned has only been touched. (6) The bibliography discloses that United Kingdom research workers have contributed a very useful quota to the general progress registered in this field."

Dr. Ries Honored

DR. HEINRICH RIES, well known to foundrymen through his outstanding work as Technical Director of the A.F.A. Foundry Sand Research Committee, was recently honored for his scientific work by being elected an Emeritus Life Member of the American Association for the Advancement of Science. Dr. Ries, for years recognized as an international authority on economic geology, early in his career became interested in foundry sands, presenting before the A.F.A. convention in 1906 what was probably the first scientific paper on foundry sand grain shapes. For his foundry sand research work, carried on while head of the Geology Department, Cornell University, Dr. Ries was given the Joseph S. Seaman Gold Medal of the American Foundrymen's Association of which he is an honorary life member and past director.

Safety Record

PRESIDENT CRAIGMILE, Greater Chicago Safety ment praising the safety record established by the Chicago Malleable Castings Company. With over 400 employees on its pay roll and operating more than 1,057,920 man-hours, this organization has gone over 600 days without a single, lost-time accident.

"Engaged in a type of manufacturing usually regarded as among the more hazardous, this record is one which has never been equaled in the foundry industry to my knowledge," Mr. Craigmile stated.

AMERICAN FOUNDRYMAN

British Foundry Trade Journal Reviews A. F. A. Book on Alloy Cast Irons

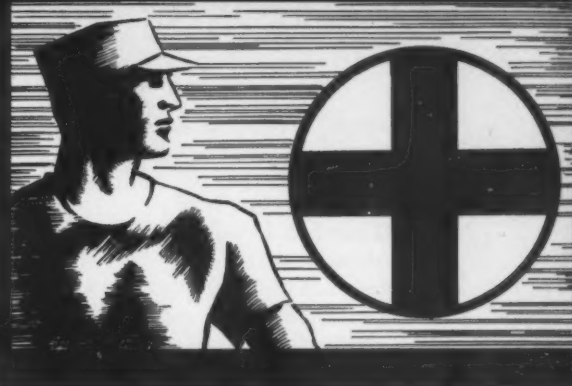
RECENTLY members of the A.F.A. received notice that the book "Alloy Cast Irons" was off the press. This book, which is a publication sponsored and prepared by a committee of the Gray Iron Division, has met with great praise from those who have read it. Members of the Association will be interested in learning of its reception abroad. The material below is quoted from an editorial review appearing in the May 18, 1939, issue of Foundry Trade Journal, published in London.

"The Progress of Alloying Cast Iron—In 1935, the American Foundrymen's Association did an outstanding service to the foundry industry of the world by the publication of their 'Cast Metals Handbook,' because they thereby rendered easily available to the buyer of castings the physical and mechanical properties of the unwrought alloys. This praiseworthy effort has now been followed up by 'Alloy Cast Irons,' which unlike its forerunner, is primarily meant for the foundry executive. In America, as in the United Kingdom, there

are several information bureaux whose object it is to procure and disseminate straightforward technical data as to the applicability of a metal to various industrial uses. Thus, in 1934 it was deemed wise to form a committee having representation from the metal producers, the manufacturers and users of alloy cast iron, and the appropriate technical societies, and charged with the duty of publishing a book containing the data so far available. They have done their work remarkably well, and they have been well supported by the officials of the Association . . .

" . . . The conclusions we have reached are: (1) The volume adequately portrays the existing state of the art. (2) It discloses the need for retraversing certain ground (e. g., effect of manganese on hardness), as there is too little agreement in published work. (3) It discloses the necessity for new research to be done, with additional elements and extended work on currently used ones. (4) It emphasizes the really wide commercial use

Hygiene



Health in Industry

By Paul A. Brehm, M.D., Madison, Wis.

This paper, "Health in Industry," was presented by Dr. Brehm before the May 19, 1939, meeting of the Wisconsin Chapter of the American Foundrymen's Association held at the Schroeder Hotel, Milwaukee. Dr. Brehm is supervisor of the Industrial Hygiene Unit, Wisconsin State Board of Health.

WITHIN recent years industry has become increasingly interested in a health program. A program to improve and protect the health of the workers, as well as to reduce the costs and time loss occasioned by disability of all types, has been inaugurated in a number of plants.

Various factors have helped to stimulate this phase of industrial development; such as workmen's compensation legislation, the activities of various health organizations and groups, the experience of accident prevention, and an appreciation of the economic loss by illness both to employer and employee. In some plants, health measures have become a part of the production scheme just as any other departmental activity within the industry.

Industry Benefits From Health Program

Aside from the humanitarian standpoint, there are sound business reasons to warrant this growing interest among industrial groups. Time loss by employees for any reason adversely affects both industry and labor. For the purpose of this discussion we will consider some of the benefits to industry resulting from a health program aimed at a reduction of time loss due to all types of illnesses.

Production

Anything that interferes with the production schedule results in increased costs; and certainly, time loss of employees, especially those who are skilled, is

an important factor in this connection. If a squeezer or sand-slinger breaks down and the maintenance man is off due to illness, the economic loss to industry can be definitely appreciated. Similarly, if a coremaker who is doing a special rush job in which he is well acquainted fails to come to work, production may be materially affected, as well as the good will of the customer involved. In the above two illustrations, it may be possible to definitely evaluate the loss to industry. There are, on the other hand, numerous operations in the plant in which the loss may not be as definitely evaluated.

Compensation Costs

It is also reasonable to assume that time lost from employment has a direct influence upon compensation costs. We know the costs of occupational accidents and diseases and we are concerned with preventing these cases. We know that accidents and diseases of occupation are preventable; therefore, is not the general health of the employee just as important from the standpoint of prevention as the guarding of machinery or the control of toxic hazards? This, again, is perhaps something intangible, but we know from our own personal experiences how good health or a feeling of well-being creates mental alertness and physical efficiency. Several studies have indicated that the one factor contributing to accidents is the health of the individual at the time of the accident has occurred: A person who has

a bad headache or cold has a tendency to be less alert, and consequently, is more subject to accidents.

This same line of thought can be extended to the attitude and capacity for work on the part of healthy employees. The willingness on the part of industry to carry out a health program first of all stimulates the support of labor. This co-operative attitude is further strengthened along with the improvement in the health of the employees. A co-operative attitude on the part of employees plus a reduction in time lost as the result of good health can only result in doing the work better and safer and being more satisfied with their jobs.

Labor Turnover

Carrying this same line of reasoning further, we feel that satisfied and co-operative employees will reduce the number of turnovers in the employment office. We do know that frequent labor turnovers are not helpful to the cost of running a business and we also know that industries with the best working environments have the largest waiting lists and therefore the best selections to fit their needs when they occur.

General Health Program

Let us briefly consider what is meant by a general health program in industry. There are several ways in which the health and safety of employees can be maintained, but of major importance at this time are the three

activities receiving the most attention.

Engineering Control

All of you have had first hand experience with one of these health phases, and that is, engineering control of occupational exposures potentially hazardous to health and safety. You in the foundry industry are well aware of the hazards incident to your particular operations and a discussion of these would be unnecessary repetition. The experiences during the past few years have shown what a knowledge of the extent of the hazards and their control might have prevented. In the light of the past we realize that it is wise logic to continue with good engineering preventative measures. In this regard, the foundry industry deserves a pat on the back for its co-operative spirit and its contributions to the present day preventative program.

Medical Control

The second health measure known to the foundry industry is that of medical control by means of a physical examination program. This is one of the most important health activities rendered to industrial workers; not only because it affords an evaluation of the physical status of the employees, but also because it provides a service for employees, which, in the majority of cases, would be economically impossible.

Physical examinations function to intelligently handle the men within their physical capabilities. Periodical re-examinations disclose early signs of disease, which, if controlled, prevent future serious disabilities. Medical control of this type affords the ultimate check on the effectiveness of engineering control measures and it is hoped that this program will be extended to all types of industries regardless of the nature of their working environments.

Study of Absenteeism

The third health activities, familiar to some of you and the one we wish to discuss more in detail, is the study of absenteeism; particularly from the standpoint of time loss due to illnesses.

Studies of this kind have only recently received attention on the part of industry and various

health groups. The importance of this program as an adjunct to other industrial health measures is evidenced by the study of data obtained from a 4 years' survey of the employees of a public utility¹ in which absences of one day or over for all causes were recorded. These data show that during this period there were 900 cases of disability either due to industrial accidents, non-industrial accidents, or illnesses, for every 1000 employees for one year. Of these 900 cases, 836 were classified as sickness, and 17.6 due to industrial accidents, or in other words, the number of cases of illness were about 47.5 times as much as the industrial accidents. Colds alone accounted for over 12 times as many cases of absenteeism as did the industrial accidents.

While the major interests have been concentrated on reducing the incidence of industrial injuries, the most important group of absentees have been neglected. The economic loss to labor occasioned by non-industrial illnesses is obvious, while the loss to industry is equally as important and estimated to be startlingly high.

Non-Industrial Disabilities

In view of the results obtained by means of a persistent occupational accident and disease prevention program, it is essential that a similar campaign should be carried out to reduce the high incidence of non-industrial disabilities. Any approach to this situation or any program for prevention and control must first be based on accurate information pertaining to the extent of the problem. An evaluation of the absentee problem can only be made as the result of careful analyses of statistical data obtained by keeping accurate sickness records.

Records of absenteeism and resulting wage loss should include all causes in order to compare industrial and non-industrial cases. Non-industrial illnesses should be recorded in as much detail as possible, particularly as to the nature of the disease. All absences, however, should be recorded under identical classifications, that is, according to age

¹Gafafer, W. M., and Frasier, E. S., *Frequency and Duration of Disabilities Causing Absence From Work Among the Employees of a Public Utility, 1933-1937*. Reprint No. 1963, U. S. Public Health Service.

groups, sex, wages and time lost, departments, and occupations before any comparative figures can be obtained.

Non-industrial illnesses should be further analyzed under this classification according to types of diseases, their frequency and duration, before any control measures can be suggested. Studies of this kind that have been made disclose the fact that respiratory diseases account for approximately 50 per cent of time loss due to non-industrial illnesses. One authority² has estimated the cost of respiratory illness in terms of wages. "Assuming that the average daily wage is about \$4," he says, "the yearly loss of wages, due to absence from work resulting from diseases of the upper respiratory tract, if distributed evenly, would be \$6 per person per year. It is estimated that there are 42 million gainfully occupied persons in the United States. Multiplying this figure by \$6 gives a total wage loss of approximately 250 million dollars suffered annually from upper respiratory ailments." It is in this group of diseases that preventative measures can best be applied toward a reduction of incidence.

Study of Respiratory Diseases

Studies have also disclosed evidence that some respiratory diseases, notably pneumonia and tuberculosis, are more prevalent among certain industrial groups than among the general population of the community. If this condition is true, it seems that industry has a vital interest in the matter from the standpoint of correction before another situation arises similar to the period of silicosis hysteria a few years ago.

Several factors enter into an accurate comparison of disease incidence among industrial workers with that for the general population. It is necessary in arriving at any conclusions to compare the two groups in the same age and economic scales. It is also essential to have comparative accuracy in recording the incidence of diseases; that is, if industries accurately record all respiratory diseases, the same should be done for the general population. This does not exist to any fair degree of accuracy at the present time. Tubercu-

²Bradley Baines, *A Toast to Health*, Occupational Hazards and Safety, Feb., 1939.

losis is probably recorded better than any other disease, while pneumonia, on the other hand, is problematical in that it is not always reported to health boards and usually the only information as to the incidence of this disease is obtained from death certificates. This discrepancy exists to a greater degree with the more common respiratory ailments such as head colds, bronchitis, influenza, grippe, etc.

Accurate Information for Statistical Analysis

It is important, however, to obtain accurate information within the industry involved so that if a statistical analysis opens the way for any remedial measures, the incidence of absenteeism can be reduced. A number of important facts can be obtained from sickness records that may suggest control measures. As examples, certain departments or types of jobs may show a higher incidence of respiratory ailments than others in a plant—this would suggest such environment influences as drafts, exposures to respiratory irritants, and changes in temperature and humidity. With this knowledge it is possible to study the problem and design remedial measures.

Another condition may be where the majority of illnesses may be confined to a few individuals scattered throughout the plant regardless of department or nature of the job—this situation lends itself to a careful medical study to determine predisposing factors or physical defects. Or, types of industries will vary as to their sickness experience, depending upon the nature of the work performed—this again suggests attention to environmental influences and the protective measures to be used.

Control Measures

Control measures depend upon the conditions existing within the plant. Unnecessary drafts may need correction, general ventilation improvements to dilute irritating exposures, and protection of the individual exposed to wide variations of temperature and humidity; such as sweat shirts, shower facilities and complete change of clothing. An important thought in the reduction of absenteeism is the educational value of a health program. It is not the intention here

to imply that all cases of illnesses occurring among industrial workers arise within the plant. However, the educational value of preventive health measures carried out in the plant are reflected in the conduct of the men in their homes and elsewhere outside the plant. A health program in industry is not an overnight affair, but requires considerable time and effort in an educational way to render the employees just as health conscious at home or in the plant as accident prevention programs tend to render them safety conscious.

Absenteeism Study

The importance of absenteeism in an industrial health program, and the fact that, outside of isolated instances, little has been accomplished on a uniform reporting basis, or a comparison between types of industries, has led us to start a study of this kind in Wisconsin. We are primarily interested in determining the extent of the problem and after an analysis of the statistics to see what can be done about the situation.

Our study has been in operation for the past six months among co-operating plants in the foundry and machine shop industries. Nineteen plants are keeping absentee records on forms supplied by us—15 foundries employing 2300 individuals and five machine shops with 1800 employees. In the main, the personnel man in the department or industry keeps the records and these in turn are submitted to us each month for tabulation. Experience in keeping these records has shown that little extra time is involved on the part of the responsible individuals.

The forms used were condensed and simplified as much as possible after considerable thought and council on the part of interested groups—the main objective in this was to simplify the reporting procedure as much as possible, but at the same time obtain sufficient accurate information for the purpose of analysis.

The information listed on these forms pertains to absentees for any reason, of 24 hours or longer. These absentees are listed by name or number, sex, age, department, type of work, first day absent, date returned to

work, actual working days lost, wages lost in dollars, cause of absence—whether illness, industrial accident, non-industrial accident, and other reasons. If illness, the type of illness and whether diagnosed by a doctor or nurse, and any remarks pertinent to the case. Another table supplies information by department as to total man days for the month. In the case of foundries, departments are divided into foundry, core room cleaning, annealing or shipping, and service. Machine shops are not broken down by departments.

The machine shop and foundry industries were selected for this study first of all because of their willingness to co-operate, and second, because they afford a comparison of incidence between workers in two industries of about equal economic status.

By this time you may expect that we are ready to give you all the answers, but it is not that easy. In the first place, the time interval of six months is not sufficient to draw any definite conclusions; it requires the experience over a 12 months' period covering seasonal variations and business trends before statistical analyses or comparisons can be made. In order to have this study mean anything at all, the interpretations of the data must be as accurate as possible and spread over a sufficiently long interval of time to take into account all the variable factors. To illustrate this, if we were to make an analysis on the basis of the records obtained in February and March during the time the recent flu epidemic was at its peak, the data would be entirely different from that obtained during the previous months or that obtained in April and May. About the only information we can safely give the co-operating industries in this study is a comparison between the same type of plants—one foundry, for example, can compare their monthly experience with other foundries in the same group to determine whether they are on the same basis or running a higher or lower illness frequency. Any comparisons of this kind are made by code numbers of plants and not names.

Purpose of Study

Now, what do we expect to accomplish by this study? As mentioned before, we want to know

(Continued on page 17)



Abstracts

Note: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Casting

CENTRIFUGAL. "Centrifugal Casting of Metals and Alloys," by J. E. Hurst, *Iron Age*, vol. 143 and vol. 144, No. 26 and No. 1, June 29, 1939, and July 6, 1939, pp. 17-20 and pp. 51-53. This is a two sectioned article; the first part being related to the history and present status of various centrifugal casting processes. Different types of centrifugal casting processes are known, but in all cases the casting machines can be classified under three headings, (a) the means adopted for the rotation of the mold, (b) the method or pouring or introducing into the mold, and (c) the form and construction of the mold. Pictures and diagrams of centrifugal casting machines are shown by the author. The second section describes the use of the centrifugal casting process in the refining of pig iron. Several of the centrifugal processes for the purification of pig iron, as developed by Jarotsky, Vroonen and Bradley & Foster, Ltd., are discussed. Diagrams on each of the above processes are shown, giving valuable facts about each process.

Cast Iron

CUTTING TOOLS. "Cutting Tools for Cast Iron," by H. H. Beeny, *Foundry Trade Journal*, vol. 60, No. 1193, June 29, 1939, pp. 571-572, 574.

It is the object of this paper to show the general machining characteristics of cast iron and to illustrate which tool materials are most likely to yield the greatest speed and economy in production. Ordinary gray cast iron is easy to machine and can be done without a lot of effort. Heat, abrasion and stress are termed the destructive influences on a cutting tool, especially while dry-machining gray cast iron. A sintered tungsten carbide tool is suitable for dry-machining iron castings because of the high cutting speed possible over a long period without regrinding. In making irons of good quality, it was noted, from the machining standpoint, that annealing irons reduces wear resistance in addition to the strength so that it was an unfavorable process for many castings. Today's cutting tools with their better rigidity, higher spindle speeds, improved lubricat-

ing systems, roller and ball bearings, bigger horse power motors, machines built to stand grueling action of high speed cutting and the quality and capacity of machine tools are discussed and their advantages to operator and employer.

MECHANICAL PROPERTIES. "Mechanical Properties of High-Strength Cast Iron," by J. O. Draffin and W. L. Collins, *A.S.T.M. Preprint* 33, 1939, 14 pp. The authors present in this paper the results of an investigation of the tension, compression, torsion, repeated torsion and bending properties of both solid and hollow specimens of an iron containing 3.06 per cent total carbon, 2.25 per cent graphite, 0.81 per cent combined carbon, 1.17 per cent silicon, 0.87 per cent manganese, 0.06 per cent phosphorus, 0.12 per cent sulphur, 0.11 per cent copper, 0.08 per cent chromium, 1.20 per cent nickel, and 0.91 per cent molybdenum. The authors reach the following conclusions: (1) in tension and torsion, high-strength cast iron is similar in action to low-strength cast iron, (2) the modulus of elasticity of high-strength cast iron is nearly the same in compression and bending and slightly less in tension, (3) the modulus of elasticity in shear is about 0.4 the value in tension and compression, (4) a hole has relatively little effect on the endurance limit in completely reversed torsion, (5) the modulus of rupture for hollow circular specimens in torsion is less than for solid specimens, the ratio of the modulus of rupture to tensile strength being approximately unity for the ratio of wall thickness to outside radius of 0.20, (6) the maximum tensile unit strain in torsion is greater than the maximum tensile unit strain in tension, the ratio decreasing as the ratio of wall thickness to outside radius decreases, (7) the modulus of rupture in bending is less for H-sections than for solid rectangular sections, (8) in a beam, the neutral surface rises as the load is increased, the rise being greater in an H-beam than in a rectangular beam, (9) no single value was found which can be said to be the value of Poisson's ration, either in tension or compression.

Malleable Iron

IMPROVEMENTS. "Gray and Malleable Iron," by Enrique Touceda, *Iron Age*, vol. 143, Nos. 25 and 26, June 22, 1939, and June 29, 1939, pp. 27-31 and pp. 17-20, 83. In this, the first section of a two-part article dealing with improvements in the manufacture of gray iron and malleable castings, the author discusses some of the history of gray iron difficulties, and then describes changes made in manufacture which resulted in high-grade castings made to consumer specification. In early days, little was known of metals and materials and so foundrymen found it hard to satisfy customers' demands; then gradually improvements began to be made to get better results. As time went on, technical organizations and metallurgical information began to add to the foundrymen's knowledge of metals and materials,

letting him know why metals were weakened or strengthened by use of alloys and why heat treatments changed structure and mechanical properties. So many changes have taken place that what was new yesterday is common-place today. In the last section, the malleable industry is discussed, telling how their problems paralleled those of the gray iron industry; and recent improvements disclosed. The problem of annealing was studied with great care, and numerous improvements have taken place. Properties were greatly improved. Malleable iron of yesterday with a low tensile strength has today a high elongation and yield point. From these two metals have come products designed to fit the purchaser's purpose, made strong by technical and metallurgical aid.

Materials Handling

CLEANING. "Cleaning of Metals," by C. C. Hermann and R. W. Mitchell, *Iron Age*, vol. 144, No. 1, July 6, 1939, pp. 48-50. Still tank method is the oldest of all metal cleaning methods. This type of tank cost is low, but labor costs usually run high. Reducing this cost is accomplished with automatic and semi-automatic machines as discussed in this article. Use of electric hoists in the agitation of the bath and handling of material with overhead trolley system and an electric hoist are some of the machines recently developed. Pictures to illustrate various points in the article are shown.

Non-Ferrous

ALUMINUM. "Solution Heat Treatment of Aluminum Casting Alloys," by Dr. Ing. R. Irmann, *Foundry Trade Journal*, vol. 60, No. 1191, June 15, 1939, pp. 531-535. The author divides the heat treatable aluminum casting alloys into three groups. The first group contains those alloys to which copper, zinc, magnesium and silicon are added to improve strength and corrosion resistance. Group two included those alloys to which copper, magnesium and silicon are added to obtain hardening. Group three includes such alloys as those to which an element such as titanium is added to refine the grain, improve mechanical properties and to improve the solution heat treatment of the alloys. The author then describes the principles of the solution and aging treatments for aluminum alloys and then outlines the requirements for furnaces to carry out such treatments. The main subjects discussed are the influence of casting conditions on the result of the solution heat treatment and loss of strength of heat treated alloys due to annealing at elevated temperatures. The author reaches the conclusions that furnaces for heat treating aluminum casting alloys should make possible a long duration of both the solution and precipitation treatments together with great accuracy in temperature; mechanical properties obtained are dependent on the solidification rate of the casting and upon the duration of the solution and precipitation heat treatments; high mechanical properties ob-

tained by heat treatment may be lost if the castings are exposed to elevated temperatures for long periods of time.

MELTING. "Gas Unsoundness in Metals," by G. L. Bailey, *The Metal Industry*, (London), vol. 54, No. 25, June 23, 1939, pp. 667-671. Special reference to the influence of melting conditions on gas absorption is the main concern of this paper; and the presence of cavities due to contraction of metal during solidification, mechanical entrapping of extraneous gases and gases evolved on solidification are also stressed. Throughout the first part of the paper oxygen and hydrogen are the two gases discussed, giving their solubility in numerous metals. The author explains how castings are made unsound by the gas evolution that takes place during solidification. A chart showing solubility of hydrogen in nickel, iron, aluminum and copper are shown along with two tables giving effect and soundness of bubbling of nitrogen and hydrogen through aluminum, copper and tin bronze. Sources of gas contamination are illustrated using corrosive conditions as an example. The effects of various gases on metals are shown. Six suggestions for minimizing gas unsoundness are brought out in this paper. The article is concluded by calling attention to the general principles involved in the removal of dissolved gases from melts.

MELTING. "Light Alloy Melting Practice," by W. C. Devereux, *The Metal Industry*, (London), vol. 54, No. 24, June 16, 1939, pp. 636-638. A paper presented before the International Foundry Congress on furnaces and fuels for light alloy melting. The author gives his views on the use of the various melting furnaces—especially the low frequency induction furnace. He first compares an oil-fired crucible furnace in maintenance costs, fuel costs, labor costs and melting losses with those of a low frequency induction furnace. A comparison chart is shown using the oil-fired crucible furnace as a basis and then showing why the low frequency induction furnace is favored. Maintenance costs of the crucible are higher due to new linings periodically. Fear of inclusions, oxidation losses through addition of magnesium, temperature losses from transferring metal and gassy metal due to running furnace slightly hotter than desirable, are difficulties found in the open-hearth furnace. These difficulties can be overcome by using the rotary furnace. Bulk melting in the open-hearth or rotary furnace means economy in fuel because of direct heat transfer. Throughout the article reference is made to the fact that temperature control and freedom from oxides, dissolved gases and other non-metallic inclusions, make good aluminum castings; while magnesium alloys must be prevented from oxidizing to be of good quality. See also, *Foundry Trade Journal*, vol. 60, No. 1191, June 15, 1939, pp. 526-528.)

Sand

PROPERTIES. "Bonding Clays and the Properties of Synthetic Molding Sands," by G. H. Piper, *Foundry Trade Journal*, vol. 60, No. 1191, June 15, 1939, pp. 509-513. The author investigated the effects on molding sand of china, ball, and fire clays, a bentonite, a colloidal clay and red clay. The base sand used in the investigation had the following grading: Clay, 0.3 per cent; fine silt, 0.5 per cent; coarse silt, 0.5 per cent; fine sand, 37.6 per cent; medium sand, 60.4 per cent; coarse sand, 0.7 per cent. Both 3 and 5 per cent bentonite and 5 per cent of each of the other clays were added to the base sand and the mixtures tested for green and dry compression strength, critical moisture content to yield maximum green strength, the effect of moisture on both green and dry compression strengths, the workable moisture content and refractoriness. According to the author's findings, bentonite had the greatest green strength and was less critical in the moisture required to produce a given strength than the other clays investigated, with the exception of the red clay. Where the latter was used, the effect of large differences in moisture percentages on strength was relatively small. Tests performed to determine the tensile strengths of moist clays showed that bentonite was the strongest. Bentonite also showed the highest green and dry strength when used in quantities and with the moisture content normal to foundry sand mixtures. With regard to refractoriness, the several clays were tested for fusion point. Bentonite showed the lowest fusion point of the clays tested, but its fusion point was equal to certain clays in natural molding sands, tested for purposes of comparison. The author gives the chemical analyses of the clays and explains the relation of clay properties to bonding power. He closes his paper with a comparison of synthetic and natural molding sands.

Steel

HEAT RESISTING. "The Alloy Casting Research Institute Test Block for Heat Resisting Alloys; Its History, Selection and Utilization," by O. E. Harder, *A.S.T.M. 1939 Preprint* 29, 12 pp. This paper, as might be known from its title, covers the development of a test block for specimens to be used in determining the high temperature tensile properties and creep characteristics of heat resisting alloys. The paper reviews the development of the test pieces and compares the various types suggested on the basis of ease of casting, soundness of specimens, mechanical properties of specimens, and the relative amount of metal required to produce a given number of specimens. The wedge test, recently developed, was chosen on the basis of these requirements. The paper describes the utilization of that test in producing specimens for three types of heat resisting alloys.

OPEN HEARTH. "Residual Metals in Open-Hearth Steel," by J. D. Sullivan and A. E. Pavlish, *Metals and Alloys*, vol. 10, No. 6, June, 1939, pp. 184-186. This is the seventh of a series of articles on this subject. This is a statistical study of composite samples taken over a period of a year and then analyzed. The investigation thus far has covered a period of 10 years and during that time, the authors report that increases in residual metals has been negligible and that there appears to be no danger that residuals will get out of control in the near future.

REFINING. "The Refining of Metal in the Basic Open-Hearth Furnace," by W. B. Lowrie, *Iron and Steel Institute*, (British), Preprint 6, 1939, pp. 1-24. The author discusses the removal of sulphur from the furnace bath when fluorspar is used. A comparison of lime contents in the slag proves that fluorspar enables it to carry excess lime. Formulas for the manganese cycle by Calclough are discussed and the rising of the bath manganese when slag is tapped are discussed. The charge worked with and without fluorspar is shown in graph and chart form to illustrate the conditions of manganese in the furnace. Oxide conditions were found to cause no rise in the bath manganese at the time of fluorspar and lime additions no

matter how much lime was used. References to the behavior of chromium, nickel, phosphorus, carbon as well as oxides in the slag are stated in the paper.

Book Notice

Foundry Work, Stimpson, Gray, Grennan. (American Technical Society, Chicago, (1939)—cloth bound, 216 pages, 148 illustrations. Price \$2.00.

A revision by John Grennan, University of Michigan, of earlier edition by W. C. Stimpson, formerly head instructor in foundry work, Pratt Institute, and B. L. Gray, instructor in foundry practice, Worcester Polytechnic Institute. A very practical book for the student and beginner in foundry work. Covers in detail molding practices, giving typical molding problems, illustrates molding machine applications, pattern mountings, open sand molding, loam molding, coremaking and melting furnace equipment and practices. The latter part of the book goes more into the engineering and technical phases of materials handling, metallurgy, testing, specifications mixing metals and heat treatment. An unusually good treatise for the student, apprentice and shopman to obtain the why of foundry practices.

Health in Industry

(Concluded from page 13)

the extent of the problem in Wisconsin industries; we want to compare different industries of about the same employment groups; and, if the information warrants, we want to be of service to do something about it. If the incidence of sickness can be reduced at all, it will be considered worth-while to both industry and labor.

It is also hoped that if this study proves of benefit that it can be extended to other industries in this present group and to other types of Wisconsin industries. The plants under study at the present time require considerable attention in order to tabulate and check the information, but the experience of even this small number will be of help in sponsoring future expansion of the program.

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